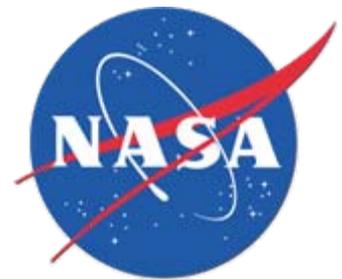


Los Angeles Supersite

Focus 1: Nocturnal Chemistry
Stutz, UCLA

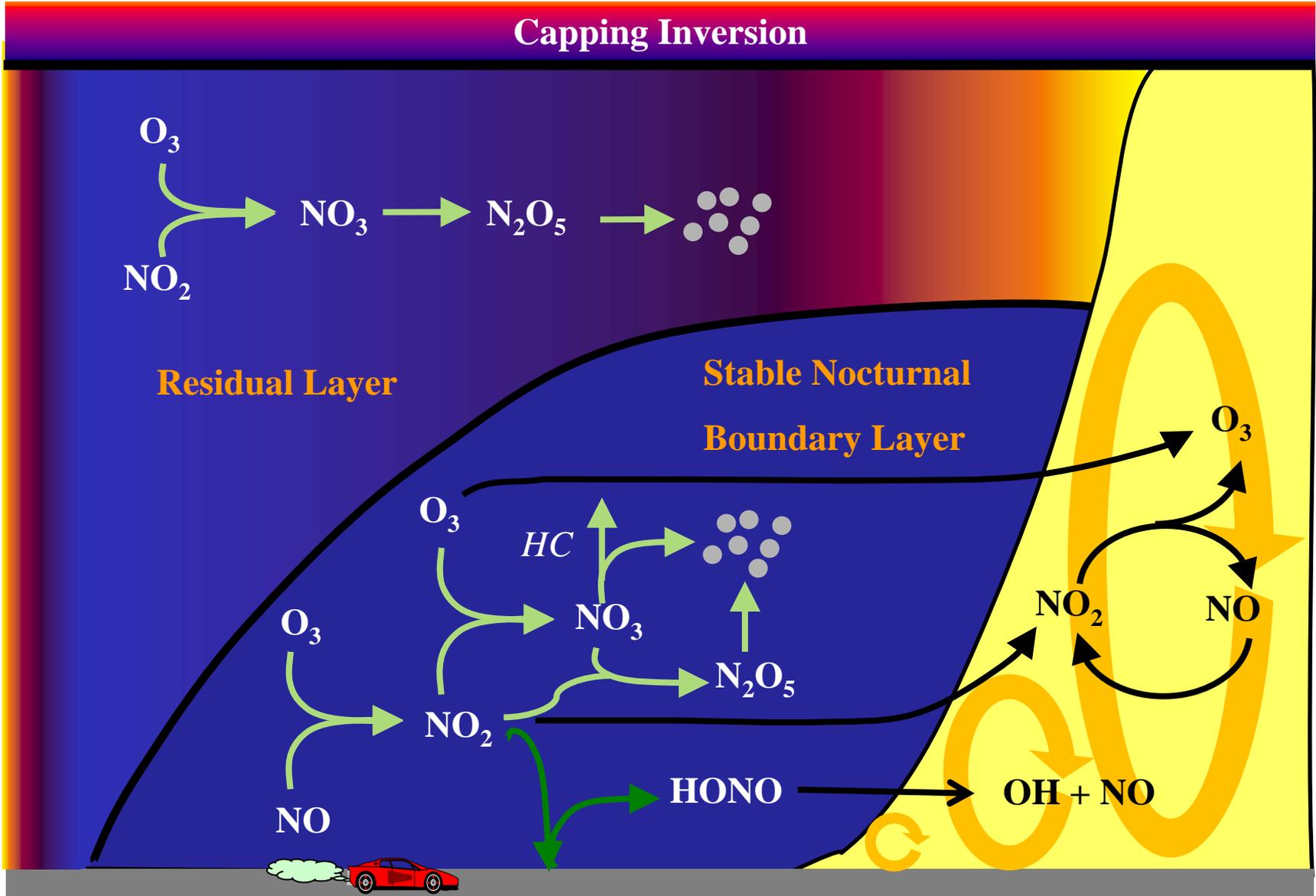
Focus 2: Secondary Organic Aerosol Project
deGouw, NOAA, Jimenez, CU

Extra: 4D remote sensing of pollutants and GHG
from Mt. Wilson
Stutz, Li, Fu, Sander, UCLA / NASA-JPL





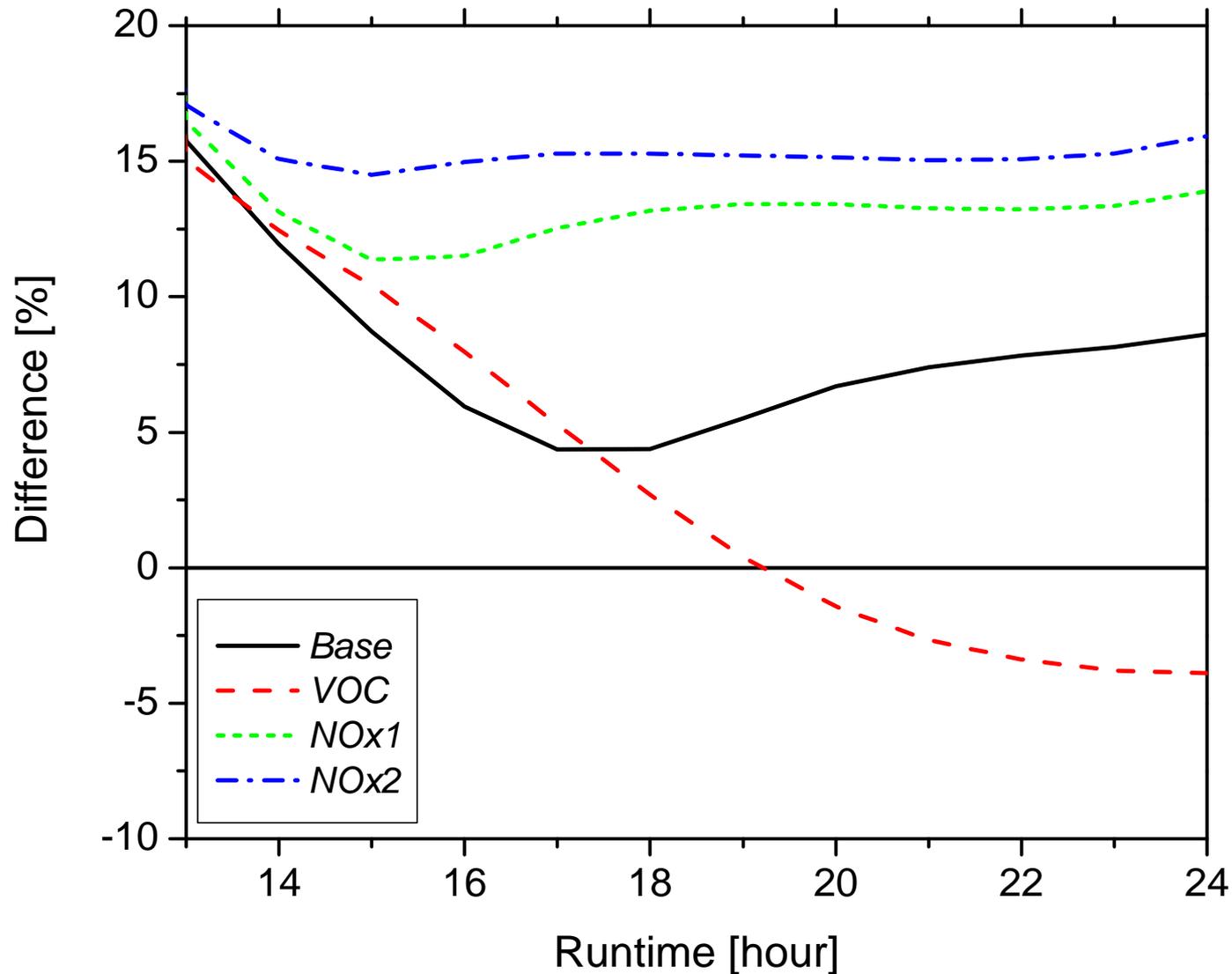
Nocturnal Chemistry in the Urban Boundary Layer of LA



Importance of NO₃ Chemistry for Daytime Ozone

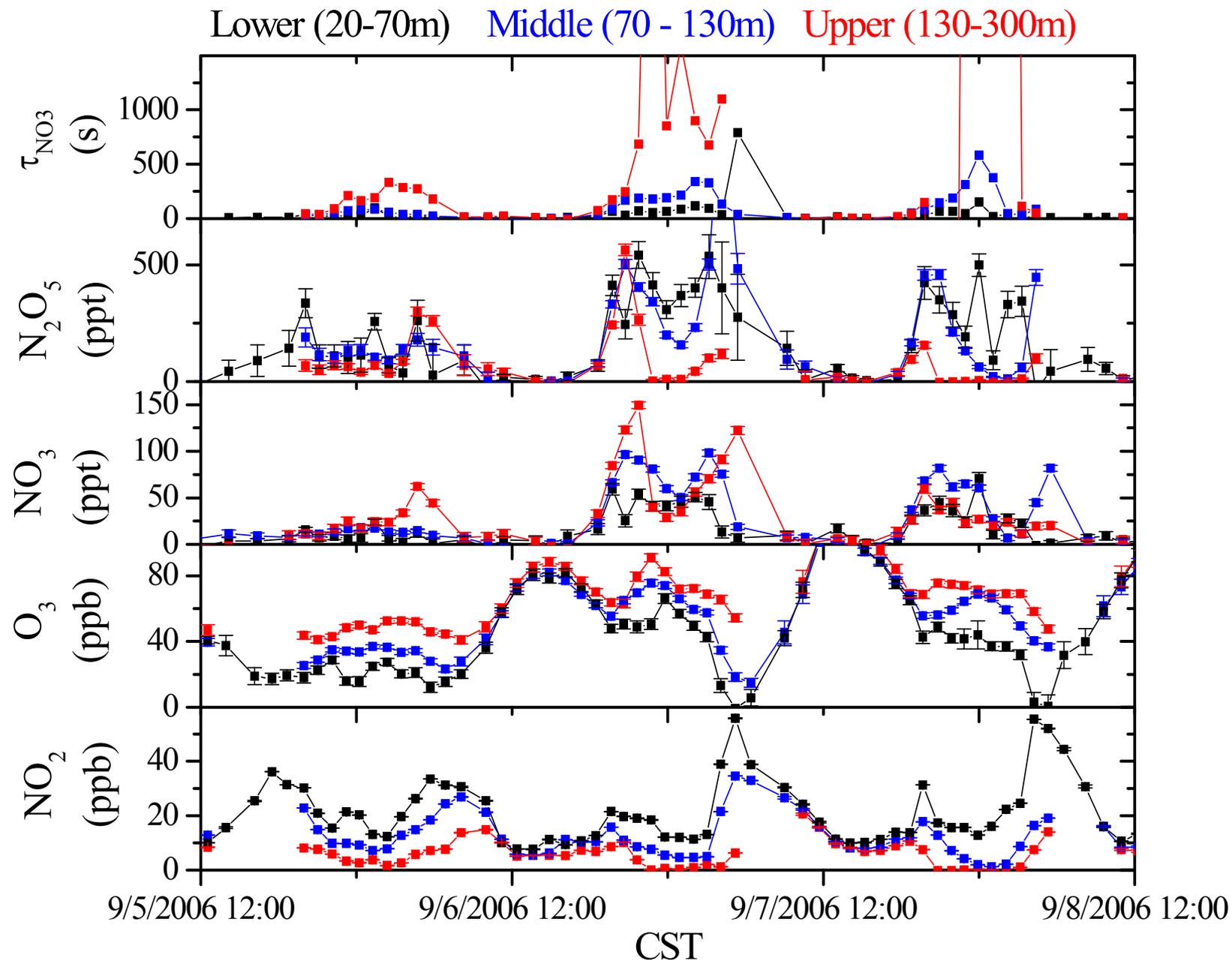


Comparison of model calculations with and without NO₃ chemistry





Vertical Concentration Profiles in Houston

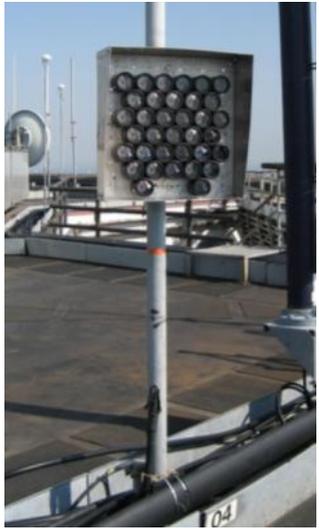
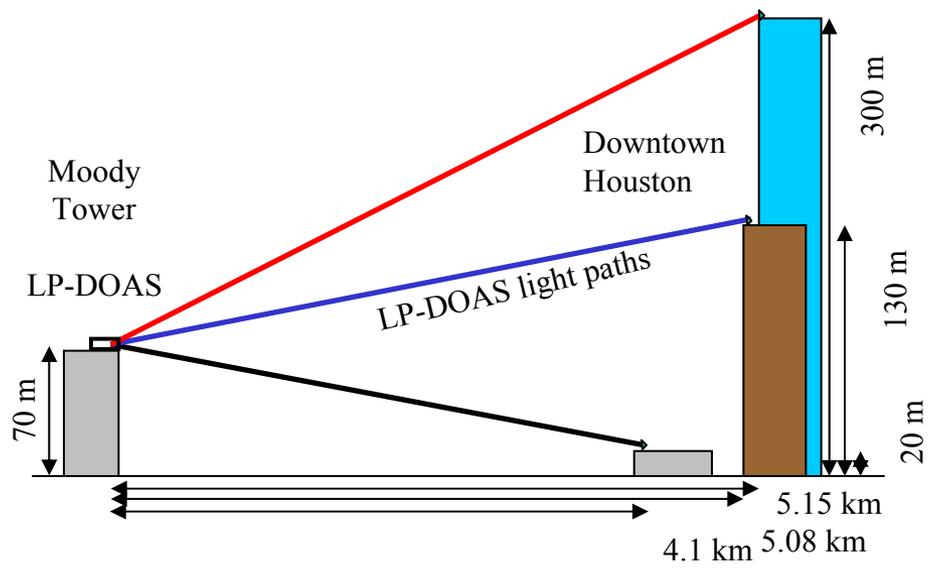
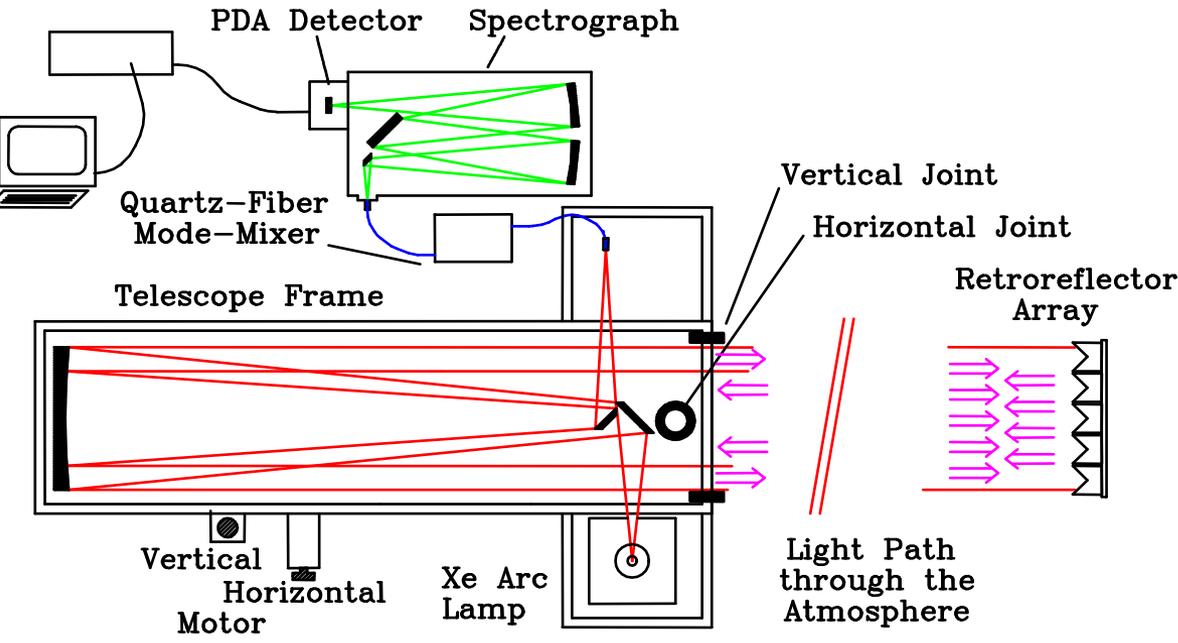




- study the vertical distribution of O_3 , NO_2 , NO_3 and N_2O_5 to determine how the suppressed vertical mixing impacts nocturnal chemistry and its altitude dependence.
- determine the nocturnal budgets of O_3 and NO_x in the Los Angeles atmosphere.
- investigate the formation of HONO in Los Angeles and develop a parameterization for chemical transport models to describe the observations
- study the impact of nocturnal chemistry on daytime ozone formation using observations and a 1D chemical transport model.
- Measurements of vertical profiles of O_3 , NO_2 , SO_2 , HCHO, HONO, and NO_3 throughout the experiment
- Interpretation using a 1D-chemical transport model constrained by met observations and $NO + O_3 \rightarrow NO_2 + O_2$ reaction.

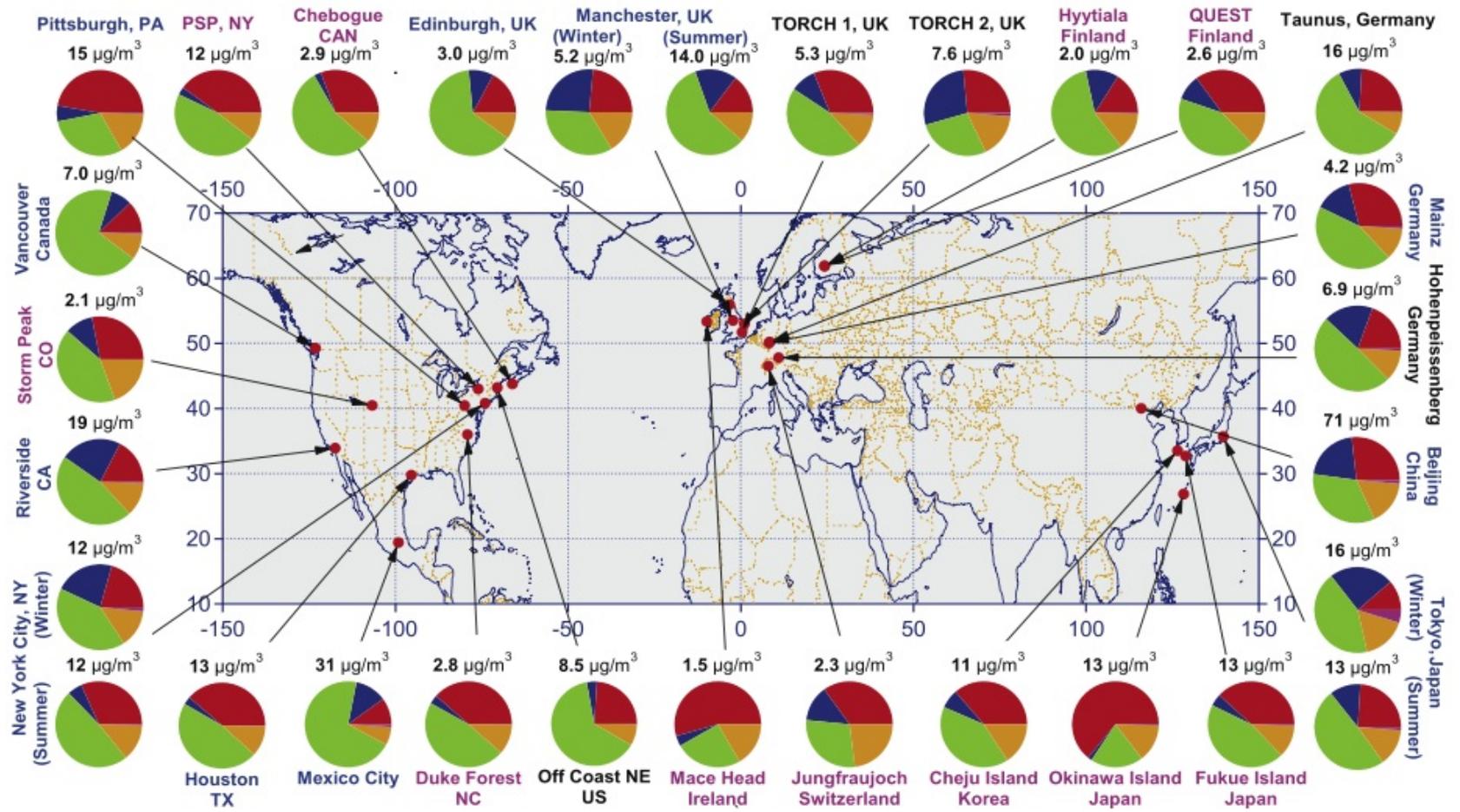


Vertical Profile Measurement with UCLA's LP DOAS System





Secondary Organic Aerosol Formation



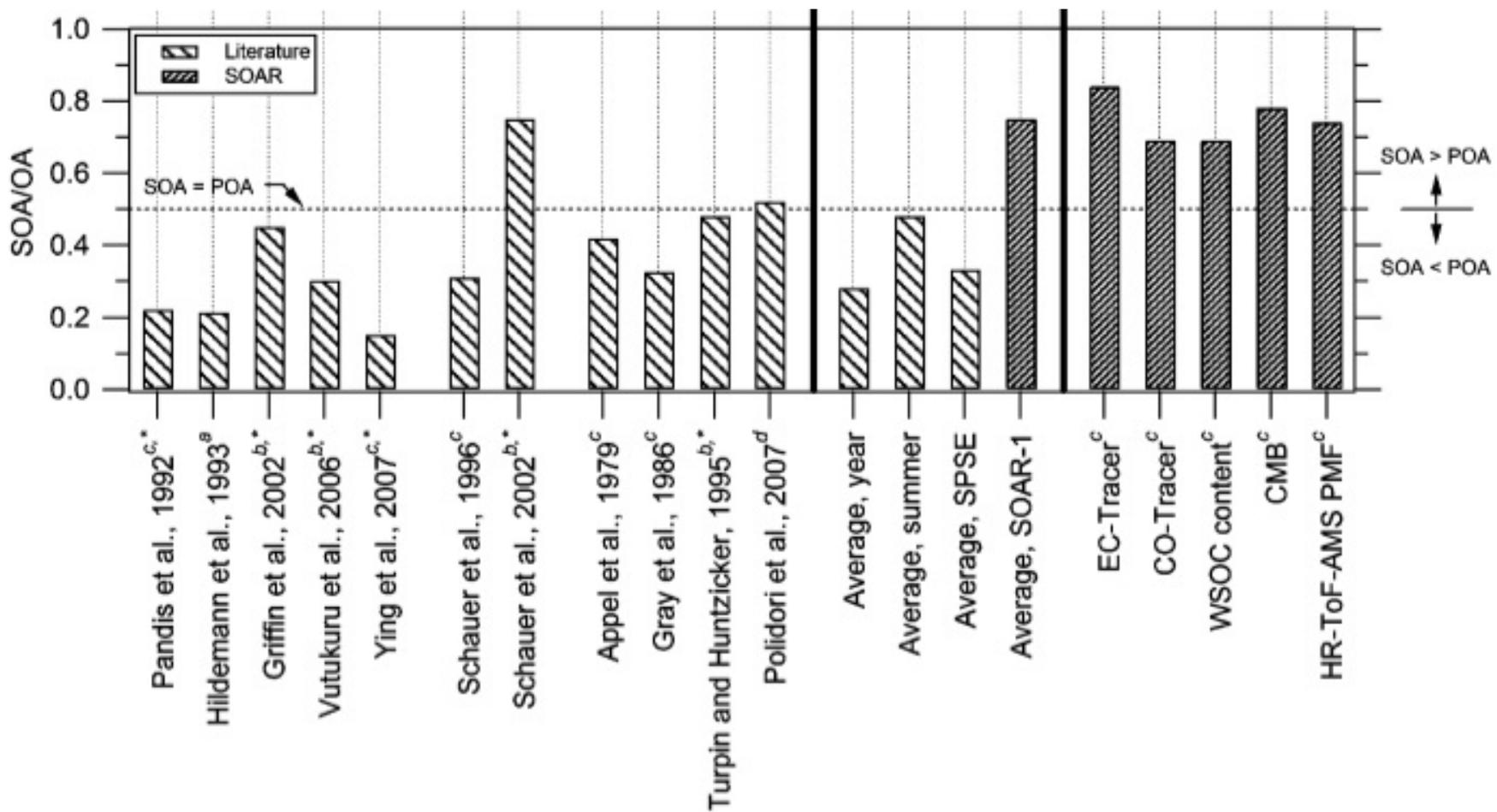
Global aerosol measurements using AMS

Zhang [GRL 2007]

A large fraction of aerosol is organic in urban and remote locations



Secondary Organic Aerosol Formation



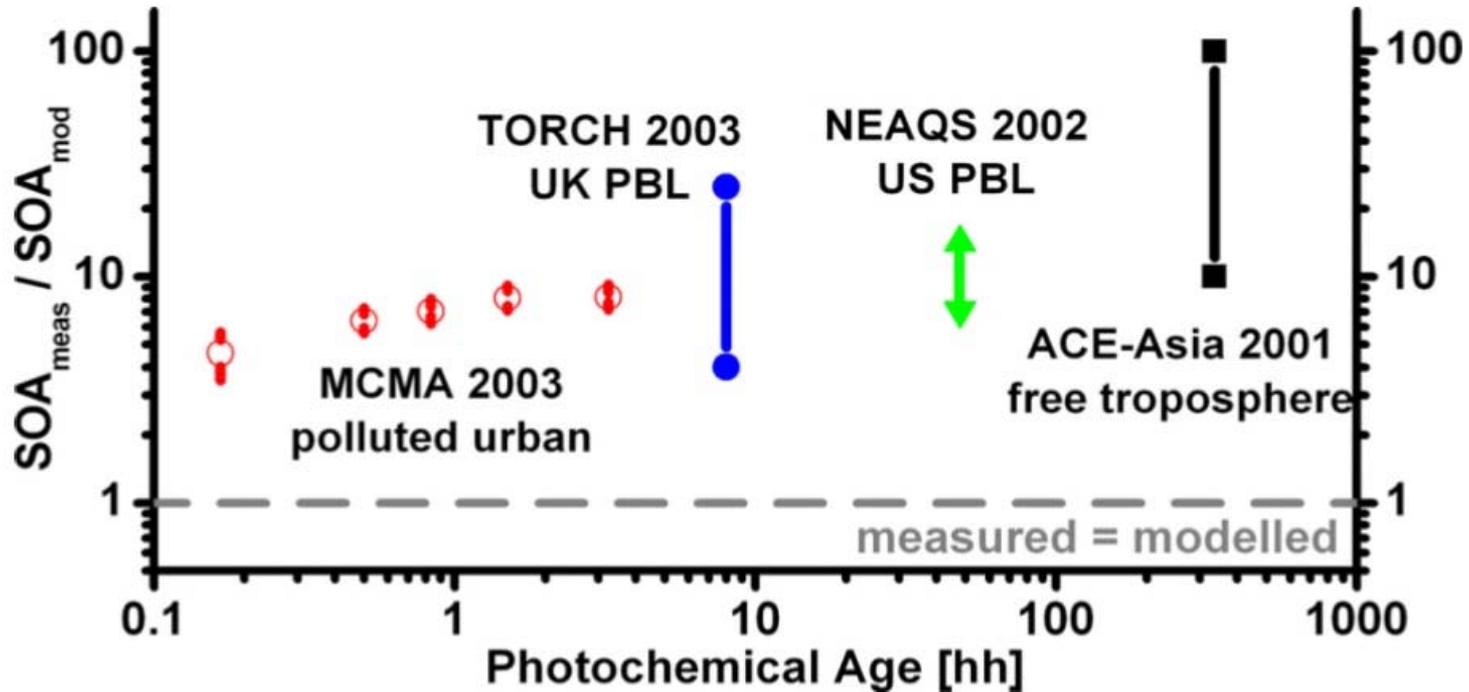
Aerosol apportionment at Riverside

Docherty [ES&T 2008]

A large fraction of urban aerosol is secondary



Secondary Organic Aerosol Formation



Summary of 4 field studies in Mexico City, U.K., eastern U.S. and east Asia

Volkamer [GRL 2006]

Urban SOA formation is rapid and much higher than modeled

Study in LA: focus on the earliest stages of SOA formation



Why is SOA higher than modeled?

- Biogenic SOA formation is enhanced in polluted air?
- Emissions of semi-volatile organic compounds (SVOCs)?
- Aqueous-phase chemistry?
- Yields from smog chamber underestimate atmospheric processes?

What will CalNex do to answer these questions?

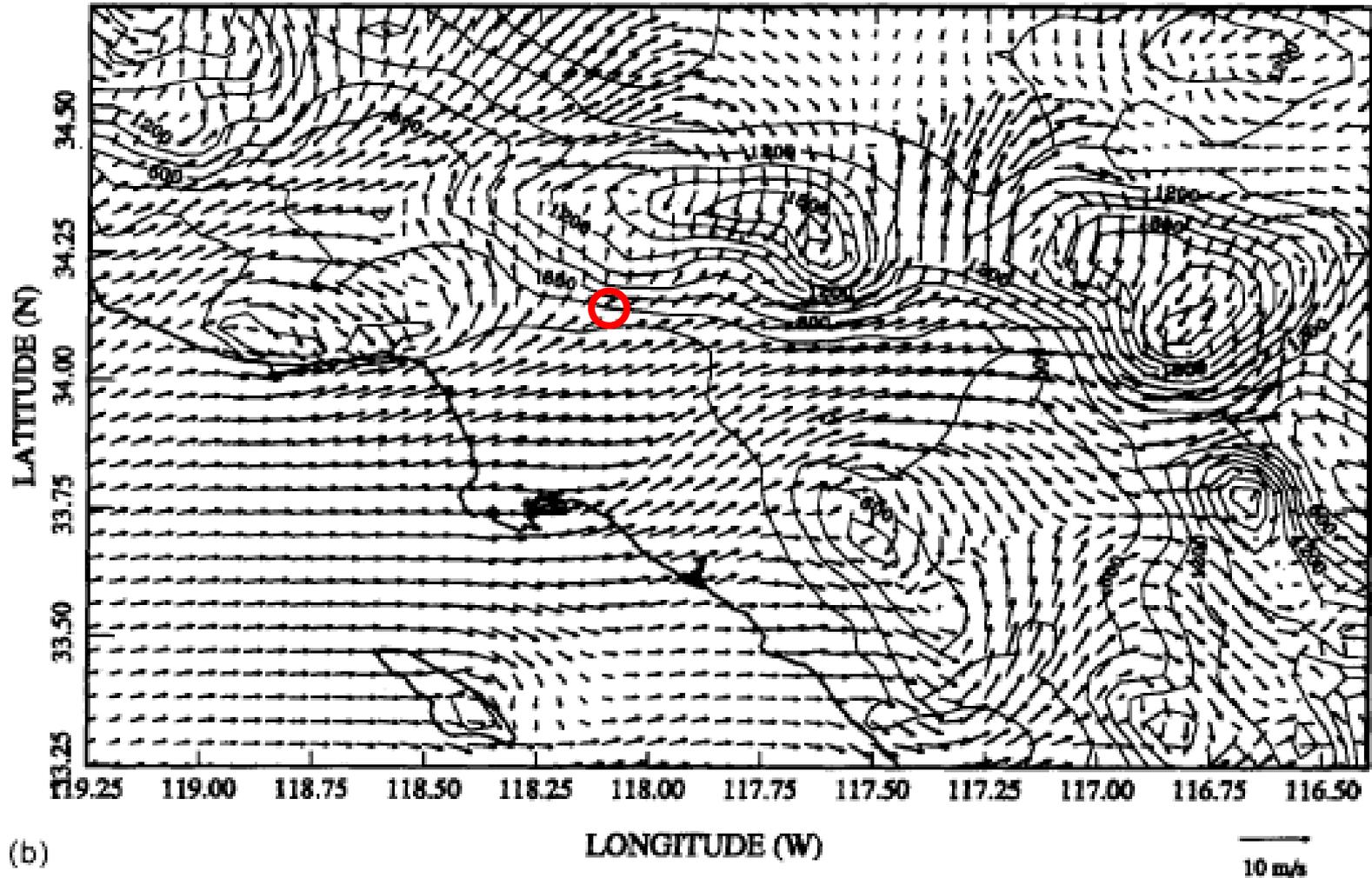
- LA: biogenic VOCs \ll anthropogenic VOCs
- Measure emissions of SVOCs
- Measure glyoxal
- Potential Aerosol Mass (PAM) method vs. measured precursors
- Measure partitioning of SVOCs and organic acids



- Location with active atmospheric chemistry and aerosol processing
- Currently 28 research groups likely to come
 - 30 – 50 scientists
 - ~50 different instruments (see tinyurl.com/CalNex-LA)
- Space requirements: ~1500ft² with ~200ft² on roof
- Power requirements: ~600amp (110V) for instruments
~600amp (110V) for AC
- 24/7 operation
- Schedule for LA Supersite
 - Setup: May 10 - 14
 - Measurements: May 15 – June 15
- Ground site information and organization

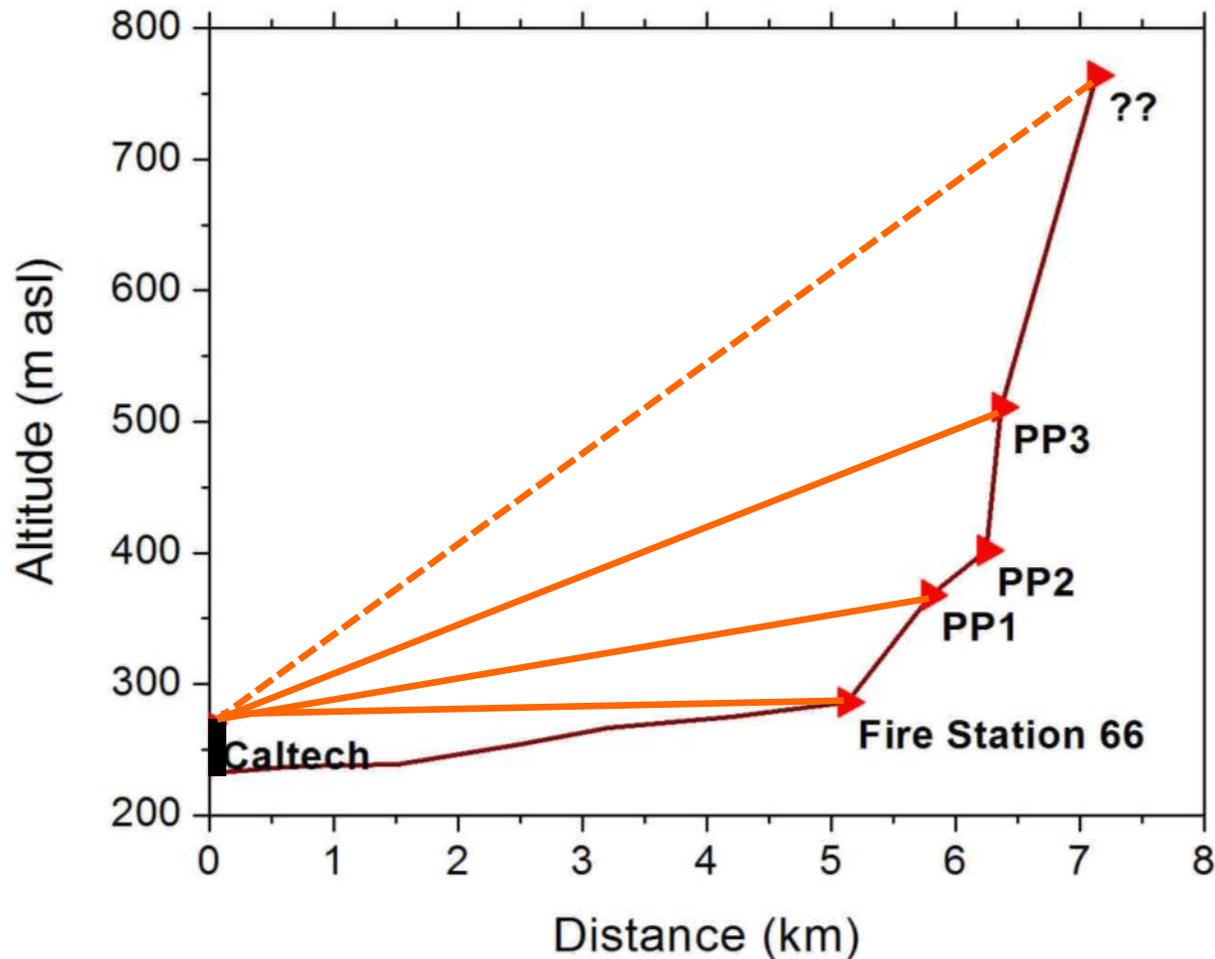
<http://tinyurl.com/CalNex-LA>

Wind Flow in Pasadena



17:00 PST, from Lu and Turco, 1996

Possible LP-DOAS setup



- LP-DOAS light path quite long from Caltech
- Alternative location Pasadena City College will be explored

Proposed Ground Site

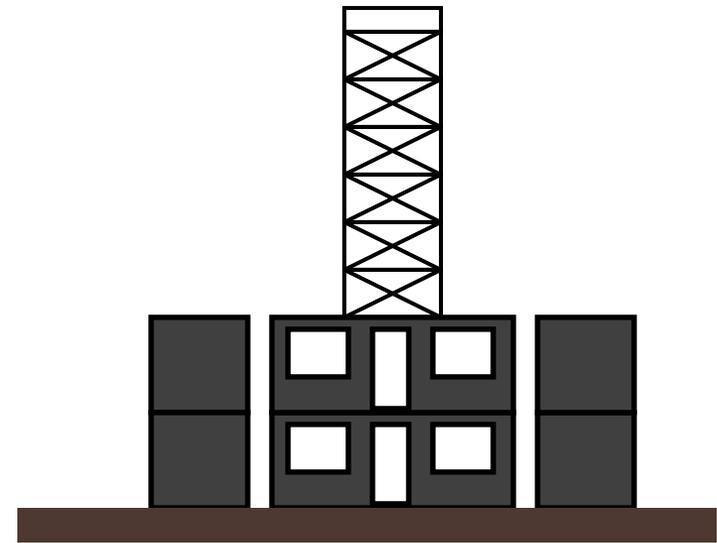
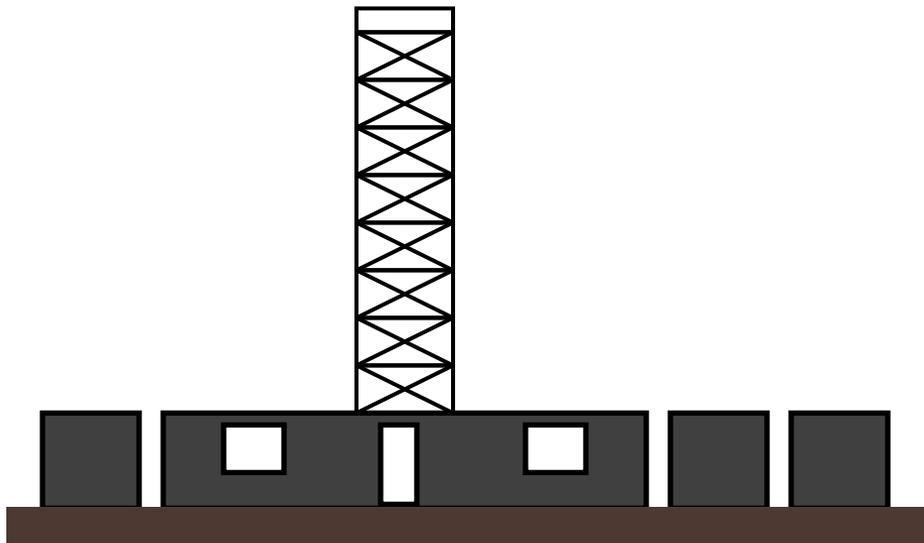


~60m x 80m lot in north-east corner of Caltech campus



Possible Ground Site Setup

- Lab Space: 5 office containers (8ft x 40ft)
- Office Space: 2 office containers (8ft x 40ft)
- Storage: 2 storage containers (8ft x 40ft)
- Sampling: 50 – 80 ft high scaffolding tower



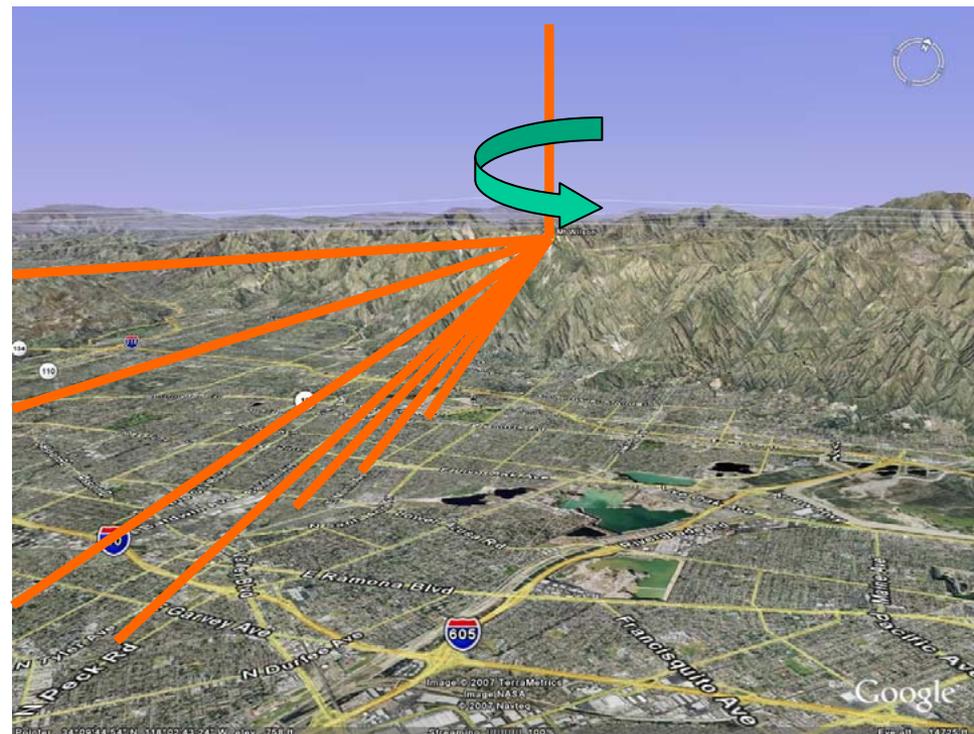
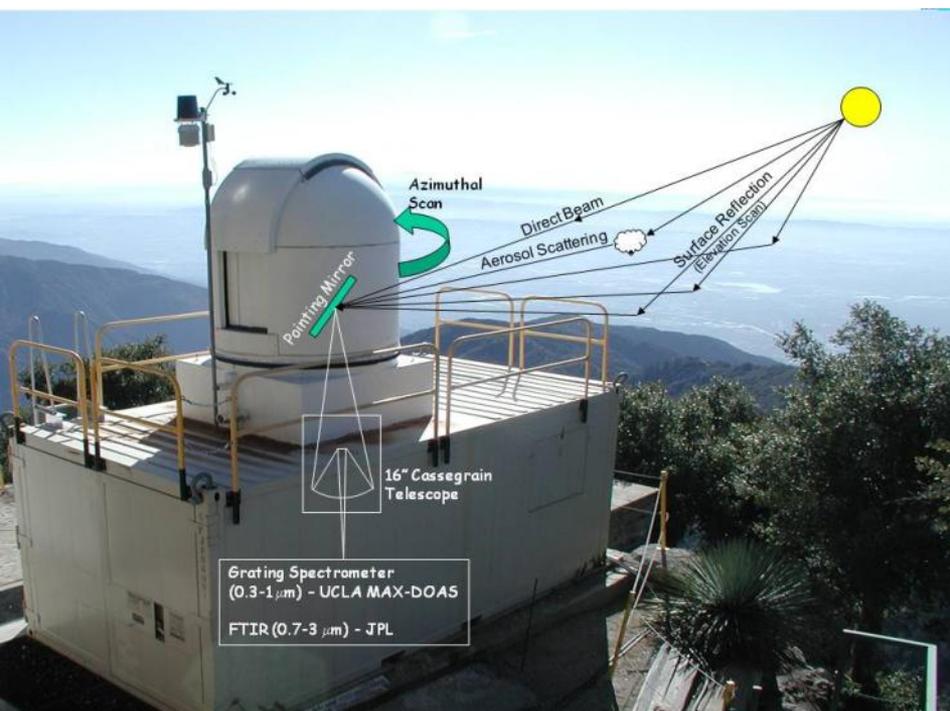


- John Seinfeld and Caltech very supportive
- Details are being worked out for the setup
 - Open questions include sampling line lengths and where to locate instruments that need short or no sampling lines.
 - Electricity
- First contact with container companies established
 - (\$325 / month for 8x40ft security container)
 - Containers can be stacked but logistics unclear.
- Contacting scaffolding companies. Everything is possible but \$\$?
- LP-DOAS setup needs to be finalized.
- OH/HO₂, NO/NO₂/NO_y, J, LIDAR are likely to be at site



Remote sensing of the spatial distribution of ozone precursor and greenhouse gas concentrations and emissions in the LA basin from Mt. Wilson, CA

J. Stutz, Q. Li, D. Fu, and S. Sander, UCLA & JPL



Mt. Wilson: High altitude site (1.7km) at the edge of the LA Basin

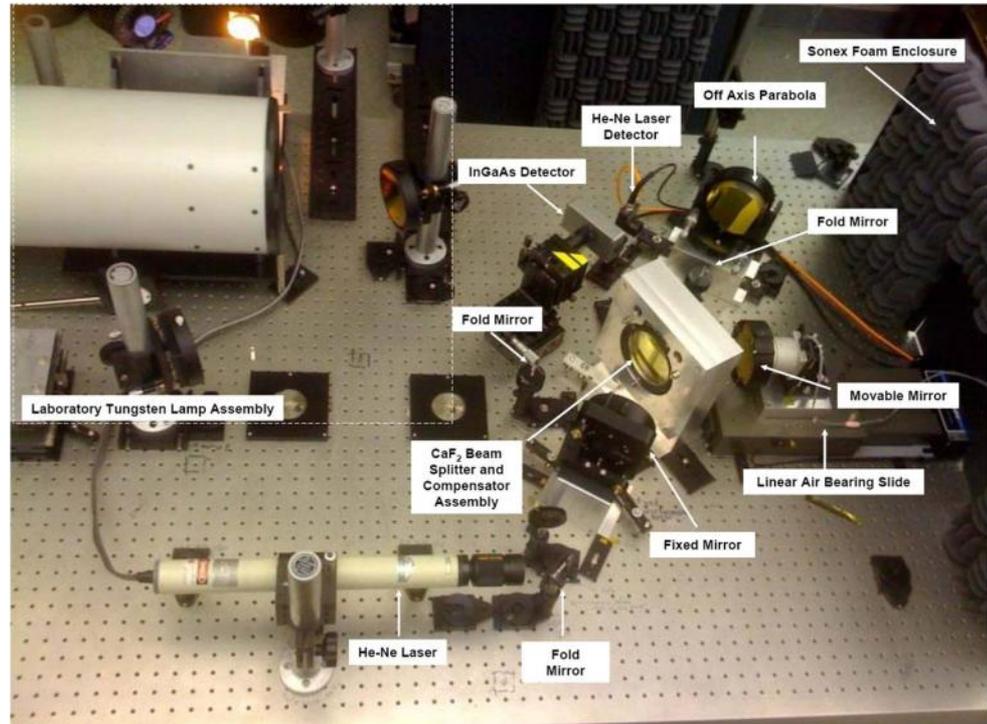


- Measurement of the 4D distribution of NO_2 , HCHO, CO, SO_2 , glyoxal, the greenhouse gases CH_4 , N_2O , CO_2 , and aerosol extinction from Mt. Wilson, using UV-vis and Near-IR absorption spectroscopy.
- Development and application of novel methods to simulate and assimilate trace gas slant column densities into regional 3D models.
- Determination of the emissions of NO_x , VOC, CO, CH_4 , and tentatively N_2O in the Los Angeles basin during CalNex 2010.
- Study of the transport of pollutants and greenhouse gases in and out of the Los Angeles Basin.
- Quantification of the trace gas levels and chemistry above the Southern Californian boundary layer.

Project Status and Outlook



- MAX-DOAS at Mt. Wilson ready to begin measurements.
- Base version of JPL's new near FT-IR spectrometer deployed and tested.
- Further improvements of FTS are planned for the next weeks.
- Access to Mt. Wilson has been restored.
- Instruments will be ready for CalNex.



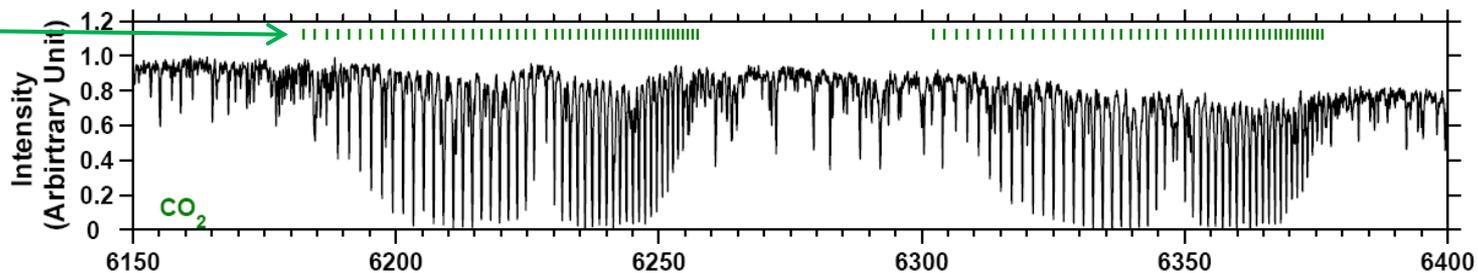
**D. Fu, J-F. Blavier, T.
Crawford,**

K. Manatt and S. Sander

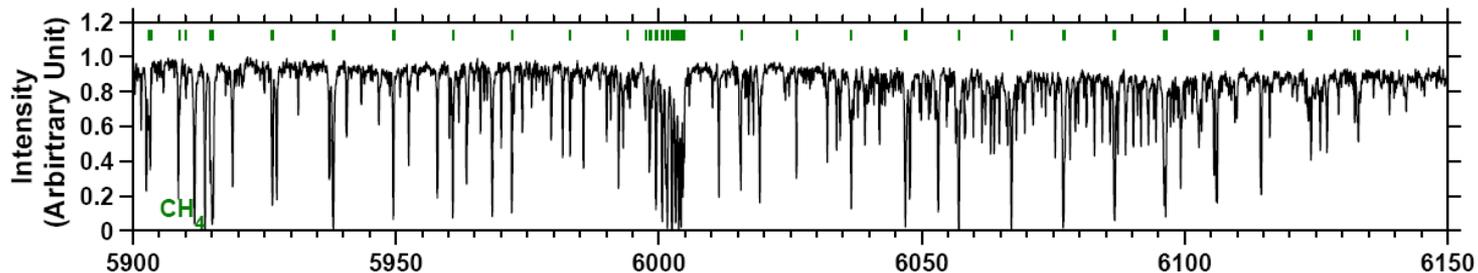


Atmospheric Spectra from CLARS FTS: CO₂, CH₄, N₂O, O₂

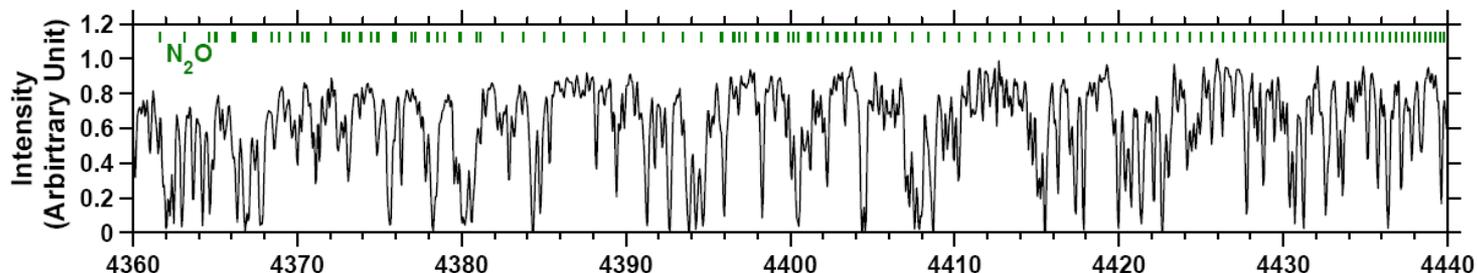
HITRAN line positions



CH₄



N₂O



O₂

for path length
calibration

